

Appl. No.
Filed08/898,678
July 22, 1997IN THE CLAIMS:

Please cancel claims 4, 9-15, 20-22, and 24 without prejudice to the continued prosecution of this subject matter in a continuation or related application. Please amend Claims 1, 6, 16, 19, and 23 as set forth below:

1. A portable vibration monitor, comprising:

a housing;

a probe;

a transducer coupled to said probe, wherein said transducer is substantially enclosed within said housing, and wherein said transducer has as an output an analog signal representative of vibrations present in a piece of vibrating machinery contacted by said first portion of said probe;

an analog to digital converter coupled to said output of said transducer, and configured to digitize said analog signal;

a processing circuit configured to receive said digitized analog signal and to produce digital data comprising [at least one vibration parameter] a value indicative of the degree of bearing wear derived from said digitized analog signal, and

an interface circuit configured to receive said digital data from said processing circuit and to transmit said digital data to a device external to said housing while said processing circuit is producing additional digital data for transmission.

- 5/ 6. A method of monitoring the condition of a machine, comprising the steps of:

storing data indicative of bearing service history or bearing assembly in a memory located proximate to a measuring point on a machine;

mechanically coupling a transducer to [a] said measuring point [on a machine];

processing an output of said transducer to produce data indicative of one or more characteristics of vibrations of said machine; and

storing said data indicative of one or more characteristics of vibrations of said machine in [a] said memory [located proximate to said measuring point on the machine].

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8 18. A handheld probe for monitoring the condition of machines, said handheld probe comprising:

a housing;

a piezoelectric transducer within said housing;

94 electrical circuitry within said housing comprising a circuit common reference point;

a metal probe comprising a coupler for connecting to a stud located at a measuring point on a machine, wherein said metal probe is mechanically coupled to said piezoelectric transducer and electrically coupled to said circuit common reference point; and

a metal contact located proximate to said metal probe, said metal contact coupled to said electrical circuitry so as to transmit electrical signals between said electrical circuitry and one or more devices external to said housing, whereby both an electrical and mechanical coupling between the stud at the measuring point is made when said metal probe is connected to said stud.

11 19. An interface between a vibration measuring point on a machine and a digital data processor, said interface comprising:

a portable, handheld housing;

95 a probe having a first portion external to said housing which is configured to mechanically couple to said vibration measuring point, said probe additionally comprising a second portion coupled to a vibration transducer;

a circuit in said housing translating an analog electrical signal output from said transducer into digital data;

wireless communication circuitry within said housing receiving said digital data, and for wirelessly transmitting said digital data in approximately real time to the digital data processor for further processing.

12 23. A method of monitoring the condition of a machine, the method comprising the steps of:

96 contacting a measuring point on said machine with a portable probe comprising a vibration transducer;

converting an output of said transducer to first data indicative of one or more characteristics of vibrations of said machine; and,

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electronically evaluating said data for characteristics associated with a stable data reading by determining the rate of change of the value of said data.

REMARKS:

Of original Claims 1-24, Claims 4, 9-15, 20-22, and 24 are canceled with this amendment. Accordingly, Claims 1-3, 6-8, 16-19, and 23 are presented for further examination. With the above specification amendment, the applicant wishes to inform the Examiner of the existence of co-pending application Serial No. 08/898,485, entitled Digital Vibration Coupling Stud, and filed on July 22, 1997.

Rejections Under 35 U.S.C. 102

The Examiner has rejected Claims 1-3, 5-8, 13-16, 19-21 and 23 under 35 U.S.C. § 102 as anticipated by U.S. Patent 4,885,707 to Nichol et al. The applicant respectfully disagrees with the Examiner's assertion that the Nichol et al. reference anticipates or renders obvious the limitations of any claims of the application as originally submitted. However, to further prosecution of the present application, Claims 4, 9-15, 20-22, and 24 have been canceled. Furthermore, amendments to Claims 1, 6, 16, 19, and 23 have been made above in accordance with the Examiner's comments in the Office Action. These amendments are made without prejudice to the prosecution of the original subject matter in a continuation or a related application.

Claim 1 has been amended to recite that the processing circuit produces digital data comprising "a value indicative of the degree of bearing wear derived from said digitized analog signal." This limitation appears in original Claim 4. In the Office Action, the Examiner has indicated that Claim 4 would be allowable if re-written to include the limitations of base Claim 1. Favorable action with respect to Claim 1 is therefore respectfully requested. As Claims 2, 3, and 5 depend from Claim 1, the applicant respectfully submits that these claims are also allowable for at least the same reasons.

Claim 6 has been amended to include the limitation of original Claim 9 which the Examiner has indicated would be allowable if re-written to include the limitations of base Claim 6. It is

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therefore respectfully submitted that Claim 6 is now allowable. In addition, it is submitted that Claims 7 and 8, which depend therefrom, are also now allowable for at least the same reasons.

Claim 16 sets forth the characteristics of a handheld vibration monitoring probe which includes a metal probe mounted thereon having several characteristics not taught or suggested in Nichol. As set forth in Claim 16, this metal probe comprises "a coupler for connecting to a stud located at a measuring point on a machine." The metal probe is also "mechanically coupled to said piezoelectric transducer and electrically coupled to said circuit common reference point." Furthermore, in conjunction with "a metal contact located proximate to said metal probe", the metal probe produces "both an electrical and mechanical coupling between the stud at the measuring point...when said metal probe is connected to said stud." None of these features are present in or suggested by the disclosure of Nichol.

As shown in Figure 1 of this reference, when the Nichol device collects data from a measuring point on a machine, separate connections to an external accelerometer and to a bar code reader are made. No teaching or suggestion of a common mechanical and electrical connection as set forth in Claim 16 is taught or suggested by Nichol. The applicant therefore submits that Claim 16 is in condition for allowance. Claims 17 and 18 are dependent on Claim 16. It is therefore also submitted that these claims are patentable for at least the same reasons.

Claim 19 has been amended to recite that the communication circuitry in the housing is wireless. A recitation of wireless communication is found in original Claim 22, which the Examiner indicated would be patentable if re-written to include the limitations of base Claim 19. Favorable action with respect to amended Claim 19 is therefore respectfully requested.

Claim 23 has also been amended to include the limitation found in original Claim 24 that the data is evaluated "by determining the rate of change of the value of said data." As Claim 24 was also found to be allowable if rewritten to include the limitations of Claim 23, allowance of amended Claim 23 is respectfully requested.

Rejections Under 35 U.S.C. § 103

The Examiner has rejected Claims 10-12 as unpatentable in view of Nichol, et al. To further prosecution of this application, these claims are canceled without prejudice.

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